

## C L A I M S

1 ) Method for determining an output in response to a given input search argument, based on longest matching prefix selection and using lookup operations in a multiple-level arrangement of node tables;

5 wherein, in successive steps, table entries in node tables of successive levels are interrogated until an end indication is found;

in which method

- selected segments of the search argument having individually determinable length each are used as index for accessing an entry in a node table, and

10 - other selected segments of the search argument having individually determinable length each are used as test argument for comparison with a test value (TV) stored in an entry of a node table, for determining a further step in the search procedure.

2 ) Method as in claim 1, wherein the selection and accessing of a node table entry is effected by

15 - a table base pointer (PTR) identifying a node table containing an entry to be subsequently accessed, and  
- an offset value.

3 ) Method as in claim 2, wherein the offset value is determined:

- EITHER by a segment (index) of the search argument, said segment being selected in  
20 response to selection information (CNT) contained in the respective entry;  
- OR by the binary test result of a comparison between a stored test value (TV) and a selected segment (test argument) of the search argument.

4 ) Method as in claim 2, wherein the offset value is determined in response to the binary test result of a comparison between a test value stored in a node table entry and a selected segment  
25 of the search argument, and that

a) if the test result has a first binary value (e.g. 0), the offset value is a given value selecting a predetermined entry in the node table selected by the table base pointer (PTR), and

b) if the test result has a second binary value (e.g. 1), then another segment of the search argument is selected in response to second selection information (CNT2) contained in the  
5 respective entry and is used as index to derive an offset value for accessing an entry in the node table selected by the table base pointer (PTR).

5 ) Method as in claim 2, wherein the offset value is determined in response to the binary test result of a comparison between a test value stored in a node table entry and a selected segment of the search argument, and that

10 a) if the test result has a first binary value (e.g. 0), the offset value is a first given value selecting a first predetermined entry in the node table selected by the table base pointer (PTR), and

b) if the test result has a second binary value (e.g. 1), the offset value is a second given value selecting a second predetermined entry in the node table selected by the table base  
15 pointer (PTR).

6) Method as in claim 1, comprising the following steps:

- selecting a node table entry;
- extracting a test value (TV) from said table entry or from a predetermined entry in another node table, if the application of a test value is indicated;

20 - selecting a segment from the search argument as test argument in response to selection information (CNT; CNT1) associated with the test value and contained in the selected table entry;

- comparing the test value to said selected test argument segment of the search argument;

and

25 - using the test result for determining the next step in the search procedure.

7) Method as in claim 6, wherein

- a table base pointer (PTR) is extracted from the selected node table entry, for selecting another node table; and

- said test value (TV) is extracted from a predetermined entry of the selected other node table.

8 ) Method as in claim 6, wherein

- a table base pointer (PTR) is extracted from the selected node table entry, for selecting  
5 another node table; and
- said test value (TV) is also extracted from the same selected node table entry.

9 ) Method as in claim 6, wherein a table base pointer (PTR) is extracted from the selected node table entry, for selecting another node table; and wherein following further substeps are executed in response to the binary test result:

- 10 - EITHER a second selection information (CNT2) is obtained from the respective entry and used to extract another segment of the search argument, which in turn is then used as index for determining an offset value for accessing an entry in the selected other node table;
- OR a predetermined location in the other node table is accessed.

10 ) Method as in claim 6, wherein a table base pointer (PTR) is extracted from the selected  
15 node table entry, for selecting another node table; and

- depending on the binary test result, one or the other of two predetermined entries in the other node table is accessed.

11 ) Method as in claim 6, wherein, when a reuse indication (R) is contained in the respective entry, and when a predetermined one of two possible test results was obtained:

- 20 - another selection information (CNT2) is used to obtain another selected segment from the search argument which, is at least partially identical to all or a portion of the previously selected test argument segment of the search argument, and
- said other selected segment is then used as EITHER an index value for accessing another node table entry, OR as a test argument to be compared to another test value.

25 12 ) Method as in claim 11, wherein

- said other selected segment is a portion of the previously used test argument segment.

13 ) Method as in claim 11, wherein

- said other selected segment is equal to or includes the previously used test argument segment.

14 ) Stored data structure comprising node tables each having plural entries, in a system for  
5 determining an output in response to a given input search argument, based on longest matching prefix selection and using lookup operations in a multiple-level arrangement of node tables;

- in which each node table entry is either accessed in response to a selected segment of the search argument, which is used as a table index, or is accessed directly in response to the  
10 result of a comparing test operation;

said node table entries including basic entries, each holding at least

- an operation indication (F1, F2) that allows the selection of at least one of the following:  
a test, an index, a test followed by an index, a last entry;
- a selection information (CNT; CNT 1, CNT2) for selecting a segment of the search  
15 argument to be used as the table index and/or the test operation when the operation indication (F1, F2) does not correspond to the last entry; and
- a table base pointer (PTR) identifying the next node table to be used.

15 ) Stored data structure as in claim 14, further comprising:

- a test value (TV) to be compared to a selected segment of the search argument; or
- 20 - an end indication (END) which is either an output indicator (NHP) or a stop indicator (NIL).

16 ) Stored data structure as in claim 14, wherein a basic entry may additionally include:

- second selection information (CNT2) for extracting a further segment from the search argument during processing of the same entry.

25 17 ) Stored data structure as in claim 14, wherein at least some of the basic entries in a node table contain:

- two items of selection information (CNT1, CNT2) each for selecting a segment of the given search argument, one of said selected segments constituting an index value for accessing an entry in a node table designated by a table base pointer (PTR), and the other one of said selected segments constituting a test argument to be compared to a stored test value  
5 (TV).

18 ) Stored data structure as in claim 14, wherein at least one of the node tables contains:

a) a section with predetermined entries to be directly accessed in response to a test result, and

b) another section containing entries to be accessed in response to an offset value  
10 derived from an index value which is a selected segment of the search argument.

19 ) Stored data structure as in claim 14, wherein

- at least one of the basic entries contains additionally a test value (TV) to be compared to a selected segment of the search argument.

20 ) Stored data structure as in claim 14, wherein

15 - at least one of the basic entries contains, besides a table base pointer (PTR) for the next node table to be used, an indication that a test value (TV) is to be used which is contained in a predetermined location of the next node table identified by said table base pointer.

21 ) Stored data structure as in claim 14, wherein

- a basic entry includes a reuse flag (R) indicating that, after initial selection of a first  
20 segment from the search argument as test argument, another segment is to be selected from the search argument which is at least partially identical to all or a portion of the previously selected search argument segment.